

penetration by the masses of fungal filaments. Vegetation thus destroyed is replaced, after the death of the fungous, first by weeds, then by short-lived grasses, and eventually by the original short-grass cover.—H. C. COWLES.

Foreign pollen on *Cycas*.—It is well known that in some cycads the ovules reach the maximum size for the species whether pollination has occurred or not; while in others the ovules, if not pollinated, soon disorganize. *Cycas Rumphii* belongs to the latter category.¹⁸ Female plants of this species are very abundant in Ceylon, but no male plants have been observed for several years. In localities where male cones of *Encephalartos* and *Macrozamia* are abundant, the pollen of these species germinates in the pollen chamber of *Cycas Rumphii* and causes the ovule to develop to the full size. Since the pollen of cycads germinates readily in artificial solutions, it is not strange that pollen of one species should germinate in the pollen chamber of another. In this case, however, no fertilization takes place, and mature seeds, which should show the embryo in an advanced stage of development, showed no trace of an embryo. A few years ago the reviewer pollinated *Stangeria* with *Zamia* and obtained three large seeds, which were planted but failed to germinate. It is possible that the pollen stimulated growth but failed to fertilize the egg, so that, as in *Cycas Rumphii*, no embryo was produced.—CHARLES J. CHAMBERLAIN.

Water culture.—In a critical discussion of the water culture method of studying growth phenomena, STILES¹⁹ calls attention to the limitations of the method. He points out the great complexity of the factors involved, and applies BLACKMAN'S idea of limiting factors. The difficulty of analyzing the results of such experiments, due to the interaction of so large a complex of factors, few of which, even those whose action is under investigation, can be controlled, is made clear. Some factors, as for instance the influence of the respiratory activity of the roots on the culture solutions, have been neglected in all water culture work. The variability of individual plants is so great that a large amount of labor is required to secure results even with a low degree of accuracy. Nevertheless, for certain kinds of problems it may be the only method available.—CHARLES A. SHULL.

Grasses of Illinois.—Miss MOSHER²⁰ has published a manual of the grasses of Illinois, recognizing 204 species in 63 genera, over one-fifth of the species being recorded for the first time as occurring in Illinois. The analytical keys, descriptions, and numerous text cuts make the bulletin very useful in the recognition of the grass flora.—J. M. C.

¹⁸ LE GOC, M. J., Effect of foreign pollination on *Cycas Rumphii*. Ann. Roy. Bot. Gard. Peradeniya 6:187-194. pl. 13. 1917.

¹⁹ STILES, WALTER, On the interpretation of the results of water culture experiments. Ann. Botany 30:427-426. 1916.

²⁰ MOSHER, EDNA, The grasses of Illinois. Univ. Ill. Agric. Exper. Sta. Bull. 205. pp. 261-425. figs. 287. 1918.